

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A catheter comprising:
 - a proximal shaft;
 - a distal shaft connected to a front portion of said proximal shaft;
 - a hub provided to the rear side of said proximal shaft;
 - a balloon connected at a front portion of said distal shaft;
 - an inner tube shaft coaxially extends through said distal shaft and said balloon and connected to a distal end of said balloon;
 - a balloon lumen for communicating said hub to the inside of said balloon; and
 - a guide wire lumen for allowing a guide wire to be inserted through said guide wire lumen, said guide wire lumen including a distal side aperture positioned on the distal side from a front end of said balloon and a proximal side aperture positioned on the rear side from a rear end of said balloon;
 - wherein at least the front portion, positioned on the rear side from said balloon, of said distal shaft is configured as a grooved portion having a groove, said grooved portion has a distal end located near a connection portion between said balloon and said distal shaft and extends toward a proximal side of said distal shaft; and
 - said groove possessing a depth which changes relative to a longitudinal extent of the distal shaft so as to be relatively larger on a distal side of said grooved portion and relatively smaller on a proximal side of said grooved portion.

2. (Original) A catheter according to claim 1, wherein said groove is formed into spiral shape or annular shape.

3. (Original) A catheter according to claim 2, wherein the pitch of said spiral or annular groove is changed in the direction toward the distal end of said catheter.

4. (Original) A catheter according to claim 1, wherein the depth of said groove is in a range of 30 to 90% of the wall thickness of said distal shaft.

5. (Canceled)

6. (Original) A catheter according to claim 1, wherein said grooved portion includes a first region, a second region, and a third region disposed in this order from the distal side, and the depth of said groove in said second region is larger than that of said groove in said third region and the depth of said groove in said first region is larger than that of said groove in said second region.

7. (Original) A catheter according to claim 1, wherein said grooved portion is provided at a portion adjacent to said balloon.

8. (Original) A catheter according to claim 1, wherein said distal shaft is made from a polymer material having a Shore D hardness of 70 or more and a flexural modulus of 11,000 kgf/cm² or more.

9. (Original) A catheter according to claim 1, wherein the product of an outer diameter (S) of said distal shaft of said grooved portion and a flexural modulus (E) of a material forming said distal shaft is in a range of 500 kgf/cm or more.

10. (Original) A catheter according to claim 1, wherein said distal shaft has a distal portion and a proximal portion, and the rigidity of said proximal portion of said distal shaft is lower than that of said proximal shaft and is higher than that of said distal portion of said distal shaft.

11. (Original) A catheter according to claim 1, wherein said groove is formed in an outer surface of said distal shaft.

12. (Currently Amended) A catheter comprising:
a proximal shaft having a high rigidity;
a distal shaft provided on a front portion of said proximal shaft so as to be in fluid communication with said proximal shaft and having a rigidity lower than that of said proximal shaft;

a hub connected to the vicinity of a rear end of said proximal shaft and configured to allow a pressure applying apparatus to be connected to said hub;

a balloon connected on a front side of said distal shaft so as to be in fluid communication with said distal shaft and configured to receive pressure applied from said hub;

an inner tube shaft coaxially extends through said distal shaft and said balloon and connected to a distal end of said balloon;

a guide wire lumen for allowing a guide wire to be inserted through said guide wire lumen, said guide wire lumen including a distal side aperture positioned on the front side from a front end of said balloon and a proximal side aperture positioned on the rear side from a rear end of said balloon;

wherein at least a distal portion of said distal shaft is configured as a grooved portion having a groove, and

said grooved portion has a distal end located near a connection portion between said balloon and said distal shaft and extends toward a proximal side of said distal shaft; and

said groove possessing a depth which changes relative to a longitudinal extent of the distal shaft so as to be relatively larger on a distal side of said grooved portion and relatively smaller on a proximal side of said grooved portion.

13. (Original) A catheter according to claim 12, wherein said groove is formed into spiral shape or annular shape.

14. (Original) A catheter according to claim 13, wherein the pitch of said spiral or annular groove is changed in the direction toward the distal end of said catheter.

15. (Original) A catheter according to claim 12, wherein the depth of said groove is in a range of 30 to 90% of the wall thickness of said distal shaft.

16. (Canceled)

17. (Original) A catheter according to claim 12, wherein said grooved portion includes a first region, a second region, and a third region disposed in this order from the distal side, and the depth of said groove in said second region is larger than that of said groove in said third region and the depth of said groove in said first region is larger than that of said groove in said second region.

18. (Original) A catheter according to claim 12, wherein said grooved portion is positioned on the rear side from said balloon.

19. (Original) A catheter according to claim 12, wherein said grooved portion is provided at a portion adjacent to said balloon.

20. (Original) A catheter according to claim 12, wherein said distal shaft is made from a polymer material having a Shore D hardness of 70 or more and a flexural modulus of 11,000 kgf/cm² or more.

21. (Original) catheter according to claim 12, wherein the product of an outer diameter (S) of said distal shaft of said grooved portion and a flexural modulus (E) of a material forming said distal shaft is in a range of 500 kgf/cm or more.

22. (Original) A catheter according to claim 12, wherein said distal shaft has a distal portion and a proximal portion, and the rigidity of said proximal portion of said distal shaft is lower than that of said proximal shaft and is higher than that of said distal portion of said distal shaft.

23. (Original) A catheter according to claim 12, wherein said groove is formed in an outer surface of said distal shaft.

24. (Canceled)

25. (Currently Amended) A catheter comprising:

- a proximal shaft;
- a distal shaft connected to a front portion of said proximal shaft;
- a hub provided to the rear side of said proximal shaft;
- a balloon provided at a front portion of said distal shaft;
- an inner tube shaft coaxially extends through said distal shaft and said balloon and connected to a distal end of said balloon;
- a balloon lumen for communicating said hub to the inside of said balloon;
- a guide wire lumen for allowing a guide wire to be inserted through said guide wire lumen, said guide wire lumen including a distal side aperture positioned on the distal side from a front end of said balloon and a proximal side aperture positioned on the rear side from a rear end of said balloon;
- a grooved portion having a groove and formed in a front portion of said distal shaft, which said groove portion has a distal end located near a connection portion

between said distal shaft and said balloon and extends toward a proximal side of said distal shaft, and

said groove has a depth in a range of 30 to 90% of a wall thickness of said distal shaft, and

said groove possessing a depth which changes relative to a longitudinal extent of the distal shaft so as to be relatively larger on a distal side of said grooved portion and relatively smaller on a proximal side of said grooved portion.

26. (Currently Amended) A catheter comprising:

a proximal shaft having a high rigidity;

a distal shaft provided on a front portion of said proximal shaft so as to be in fluid communication with said proximal shaft and having a rigidity lower than that of said proximal shaft;

a hub connected to the vicinity of a rear end of said proximal shaft and configured to allow a pressure applying apparatus to be connected to said hub;

a balloon provided on a front side of said distal shaft so as to be in fluid communication with said distal shaft and configured to receive pressure applied from said hub;

an inner tube shaft coaxially extends through said distal shaft and said balloon and connected to a distal end of said balloon;

a guide wire lumen for allowing a guide wire to be inserted through said guide wire lumen, said guide wire lumen including a distal side aperture positioned on the front side from a front end of said balloon and a proximal side aperture positioned on the rear side from a rear end of said balloon;

a grooved portion having a groove and formed in a front portion of said distal shaft, which said groove portion has a distal end located near a connection portion between said distal shaft and said balloon and extends toward a proximal side of said distal shaft;~~and~~

said groove has a depth in a range of 30 to 90% of a wall thickness of said distal shaft, and

said groove possessing a depth which changes relative to a longitudinal extent of the distal shaft so as to be relatively larger on a distal side of said grooved portion and relatively smaller on a proximal side of said grooved portion.